UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,975	10/02/2003	Yasuyuki Nozuyama	2102487-991290	1558

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DLA PIPER RUDNICK GRAY CARY US, LLP
2000 UNIVERSITY AVENUE
E. PALO ALTO, CA 94303-2248

EXAMINER
TRIMMINGS, JOHN P

ART UNIT	PAPER NUMBER
2138	

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

		Application No.	Applicant(s)
Office Action Summary		10/678,975	NOZUYAMA, YASUYUKI
		Examiner	Art Unit
		John P. Trimmings	2138

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>*02 October 2003*</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☒ Claim(s) *2,7-9,14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>*02 October 2003*</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☒ Some * c)☐ None of:

      1.☒ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>*10/02/2003*</u>.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claims 1-14 are presented for examination.

Priority

1.   The examiner acknowledges the applicant's claim of foreign priority. Applicant

cannot rely upon the foreign priority papers to overcome certain rejections for a

commonly owned reference because a translation of said papers has not been made of

record in accordance with 37 CFR 1.55. See MPEP § 201.15.

2.   Should the applicant desire to obtain the benefit of foreign priority under 35

U.S.C. 119(a)-(d) prior to declaration of an interference, a translation of the foreign

application should be submitted under 37 CFR 1.55 in reply to this action.

Information Disclosure Statement

3.   The examiner has considered the applicant's Information Disclosure Statement

dated 10/02/2003.

Specification

4.   The Abstract of the disclosure is objected to because line 4 should be corrected

to recite, "... selecting module configured to ...".

Correction is required. See MPEP § 608.01(b).

5.   The disclosure is objected to because of the following informalities:

Page 4 line 7: The examiner requests the following correction: "... information of the circuit.".

Page 25 line 5: The examiner requests the following correction: "... test pattern, which leads to ...".

Page 25 line 10: The examiner requests the following correction: "... induce a long test time, are ...".

Page 27 line 11: The examiner requests the following correction: "... undetected faults, detected faults by ...".

Page 36 line 2: The examiner requests the following correction: "... that are given an a weight of ...".

Page 28 line 20: The examiner requests the following correction: "... are is entered into the fault ...".

Page 42 line 3: The examiner requests the following correction: "... Here, W_h is the total added weight that are is given to the extracted faults and W_a is the total added weight that are is given to all faults.".

Page 43 line 1: The examiner requests the following correction: "... fault list 310b is other another embodiment ...".

Page 43 line 3: The examiner requests the following correction: "... is extracted in the first ...".

Appropriate correction is required.

Claim Objections

6.   Claim 7 is objected to because of the following informalities:

Line 2 of the claim should be corrected to recite, "... extracting condition is a

value ...".

7.   Claim 9 is objected to because of the following informalities:

Line 19 of the claim should be corrected to recite, "... that are added to the

weights ...".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly
claiming the subject matter which the applicant regards as his invention.

8.   Claims 1, 3 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

The phrase, "a plurality of additionally selected test patterns" is indefinite

because the examiner is not sure if the plurality selected is newly selected from the

plurality of verification patterns, or is selected from the original list of selected test

patterns.

Also, the phrase, "from each other" is indefinite because the examiner is not sure of to what the "other" is referring. It appears that the complementary detection may be between:

selected test patterns and 2nd undetected faults; or between

selected test patterns and weighted unselected test patterns or,

in place of the "selected test patterns" above, "additionally selected test patterns".

9.   Claims 2, 8 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As per Claim 2:

The claim refers to;

"an additionally selected test pattern" in the 17th line, and

"the additionally selected test pattern" in the 21st line.

The examiner is not sure if these additionally selected test patterns refer to the "additionally selected test patterns" of Claim 1, or a newly instantiated "additionally selected test pattern" in line 17 of this claim.

As per Claim 8:

The claim refers to;

"an additionally selected test pattern" in the 16th line, and

"the additionally selected test pattern" in the 20th and 21st line.

The examiner is not sure if these additionally selected test patterns refer to the

"additionally selected test patterns" of Claim 1, or a newly instantiated "additionally

selected test pattern" in line 17 of this claim.

As per Claim 14:

> The claim refers to;
>
> "an additionally selected test pattern" in the 18th and 19th line, and
>
> "the additionally selected test pattern" in the 24th and 25th line.

The examiner is not sure if these additionally selected test patterns refer to the

"additionally selected test patterns" of Claim 1, or a newly instantiated "additionally

selected test pattern" in line 17 of this claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10.   Claim 9 is rejected under 35 U.S.C. 101 because the claimed invention is

directed to non-statutory subject matter. Computer programs claimed as computer

listings per se, i.e., the descriptions or expressions of the programs, are not physical

"things." They are neither computer components nor statutory processes, as they are

not "acts" being performed. Such claimed computer programs do not define any

structural and functional interrelationships between the computer program and other

claimed elements of a computer that permit the computer program's functionality to be

realized. In contrast, a claimed computer-readable medium encoded with a computer

program is a computer element which defines structural and functional interrelationships

between the computer program and the rest of the computer which permit the computer

program's functionality to be realized, and is thus statutory. See Lowry, 32 F.3d at 1583-

84, 32 USPQ2d at 1035.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11.   Claims 1, 3-7 and 9-13 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Nozuyama (herein Nozuyama 160), Japanese Application

Publication No. 2001-273160 in view of the applicant's description of Nozuyama 160 in

the Background of the application on pages 2-3, in view of Nozuyama (herein

Nozuyama 500), Japanese Application Publication No. 2000-276500 in view of the

applicant's description of Nozuyama 500 in the Background of the application on pages

3-4, and further in view of Sekine, Japanese Patent No. JP401088266A.

As per Claim 1:

Nozuyama 160 teaches an apparatus for selecting test patterns (see Abstract

and Title) comprising: a first test pattern selecting module (see page 3 of application)

configured to classify a plurality of verification patterns of a logic circuit of an LSI (page

3 lines 1-3) into a plurality of selected test patterns (page 3 line 6) fulfilling a reliability

criterion (page 3 line 3; the patterns that are "functional") and a plurality of unselected

test patterns (page 3 lines 9, 10) failing to fulfill the reliability criterion (page 3 line 7; "In

contrast", meaning not functional); a fault simulation module (page 3 line 9) configured

to simulate whether the plurality of selected test patterns and the plurality of unselected

test patterns detect a plurality of faults estimated to occur in the logic circuit (page 3

lines 9-13), but fails to further teach the claimed weighted undetected fault verification.

But in the analogous art of Nozuyama 500, the feature is disclosed, wherein a weighting

module is configured to add weight to each of a plurality of first undetected faults that

are undetected (see page 4, which refers to treating the undetected faults of Nozuyama

160 on page 3) by the plurality of selected test patterns and define the plurality of first

undetected faults that are given the weight as a plurality of first weighted undetected

faults (page 4 second paragraph). And on page 4 lines 15-17, the advantage of

Nozuyama 500 is a reduced set of test patterns derived with a small decrease in fault

coverage. One with ordinary skill in the art at the time of the invention, motivated as

suggested, would have found it obvious to apply the weighted method of Nozuyama 500

to Nozuyama 160 in order to create a better, smaller list of test patterns. Nozuyama 160

further discloses a fault sampling module (see the Figure on the Abstract, and page 3 of

the application) configured to extract a plurality of second undetected faults from the

plurality of first weighted undetected faults; and a second test pattern selecting module

configured to extract a plurality of additionally selected test patterns that detects

complementarily the plurality of second undetected faults from each other from the

plurality of unselected test patterns (page 3 lines 23-26) based on a criterion of the

added weight (as is supported by Nozuyama 160 on page 4). However, neither of

Nozuyama 160 nor Nozuyama 500 discloses that the weighting reflects a plurality of

layout elements of the logic circuit. But in the analogous art of Sekine, this feature is

disclosed in the Abstract, wherein the network structure and relationships in connection

between the nodes are weighted when generating test vectors automatically. And also

in the Abstract in the last 3 lines, an advantage stated is a means of reducing the

number of test vectors by combining steps together. One with ordinary skill in the art at

the time of the invention, motivated as suggested, would have found it obvious apply the

teachings of Sekine to edit vectors, including the weighted method, in order to decrease

the size (number of test vectors) of the test patterns.

As per Claims 3 and 9:

Nozuyama 160 teaches a computer implemented method or program for

selecting test patterns (see Abstract and Title) comprising: classifying a plurality of

verification patterns of a logic circuit of an LSI into a plurality of selected test patterns

(page 3 line 6) fulfilling a reliability criterion (page 3 line 3; the patterns are "functional")

and a plurality of unselected test patterns (page 3 lines 9, 10) failing to fulfill the

reliability criterion (page 3 line 7; "In contrast", meaning not functional); simulating

whether the plurality of selected test patterns detects a plurality of faults estimated to

occur in the logic circuit (page 3 lines 9-13); but fails to further teach the claimed

weighted undetected fault verification. But in the analogous art of Nozuyama 500, the

feature is disclosed, wherein a weighting module is configured to provide adding a

weight reflecting a plurality of layout elements of the logic circuit to each of a plurality of

first undetected faults that are undetected (see page 4, which refers to treating the

undetected faults of Nozuyama 160 on page 3) by the plurality of selected test patterns

and defining the plurality of first undetected faults that are added the weights as a

plurality of first weighted undetected faults (page 4 second paragraph), and motivation

for Nozuyama 500 has been previously stated. Nozuyama 160 further discloses

extracting a plurality of second undetected faults (see Figure on the Abstract, and page

3 of the application) from the plurality of first weighted undetected faults based on an

extracting condition; simulating whether the plurality of unselected test patterns detects

the plurality of second undetected faults (see again discussion on page 3 and 4); and

selecting a plurality of additionally selected test patterns that detects complementarily

the plurality of second undetected faults from each other from the plurality of unselected

test patterns (page 3 lines 23-26) based on a criterion of the added weight (as is

supported by Nozuyama 160 on page 4). However, neither of Nozuyama 160 nor

Nozuyama 500 discloses that the weighting reflects a plurality of layout elements of the

logic circuit. But in the analogous art of Sekine, this feature is disclosed in the Abstract,

wherein the network structure and relationships in connection between the nodes are

weighted when generating test vectors automatically. And in view of the motivation for

Sekine previously stated, the claims are rejected.

As per Claims 4 and 10:

Nozuyama 160 further discloses the computer program product or method of

claim 3 or 9, wherein the reliability criterion is functional verification coverage (page 3 of

application, line 5, "functional verification"). And in view of the motivation previously

stated, the claim is rejected.

As per Claims 5 and 11:

Nozuyama 160 further discloses the computer program product or method of

claim 3 or 9, wherein the reliability criterion is coverage of the plurality of faults (page 3

of application, line 5, "RTL code coverage"). And in view of the motivation previously

stated, the claim is rejected.

As per Claim 6 and12:

Nozuyama 160 further discloses the computer program product or method of

claim 3 or 9, wherein the extracting condition is a random sampling (page 3 lines 11-

14). And in view of the motivation previously stated, the claim is rejected.

As per Claims 7 and 13:

Nozuyama 500 further discloses the computer program product or method of

claim 3 or 9, wherein the extracting condition is value proportional to the added weight

(page 4 lines 2-15). And in view of the motivation previously stated, the claim is

rejected.

Allowable Subject Matter

12.   Claims 2, 8 and 14 would be allowable if rewritten to overcome the rejections

under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of

the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance: The reference art of Nozuyama 160, Nozuyama 500 and Sekine teach a method and program based on an apparatus for selecting test patterns using selected and unselected patterns, combining selected patterns complementarily with weighted undetected and unselected faults based on an extraction critereon. However, the prior arts of record taken alone, or in combination failed to teach, anticipate, suggest, or render obvious the claimed invention or the method steps of the application. Specifically, as per Claims 2, 8 and 14, the prior arts failed to teach, anticipate, suggest, or render obvious the limitation introduced into these claims, namely: excluding from processing the test patterns failing to fulfill a second criterion of the evaluation value; and by which an evaluation value is a maximum from the candidate test patterns. Consequently, Claims 2, 8 and 14 are allowable over the prior arts of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."
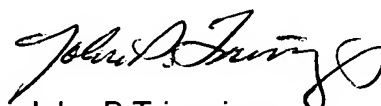

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John P. Trimmings whose telephone number is (571)

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272-3830. The examiner can normally be reached on Monday through Thursday, 7:30
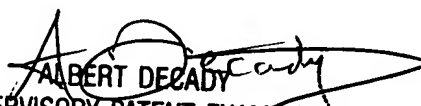
AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Albert DeCady can be reached on (571) 272-3819. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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Business Center (EBC) at 866-217-9197 (toll-free).

John P Trimmings
Examiner
Art Unit 2138

jpt

ALBERT DECADY
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100